NASA Earth Missions - Understanding the earth from space

May 28, 2017
2:00 pm – 4:00 pm
Taipei Astronomical Museum

Flight System Manager for NISAR Mission

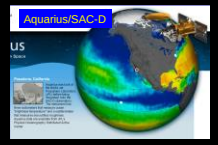
Launch 2021

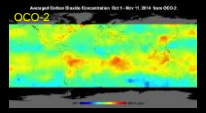
Credits: NASA/JPL-Caltech

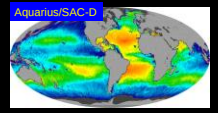
Past Experiences (1993 – 2013)
Mars Programs

Credits: NASA/JPL-Caltech

Past Experiences (2012 – 2015)







Credits: NASA/JPL-Caltech

GALEX (The Galaxy Evolution Explorer)

Credits: NASA/JPL-Caltech

Deep Space One

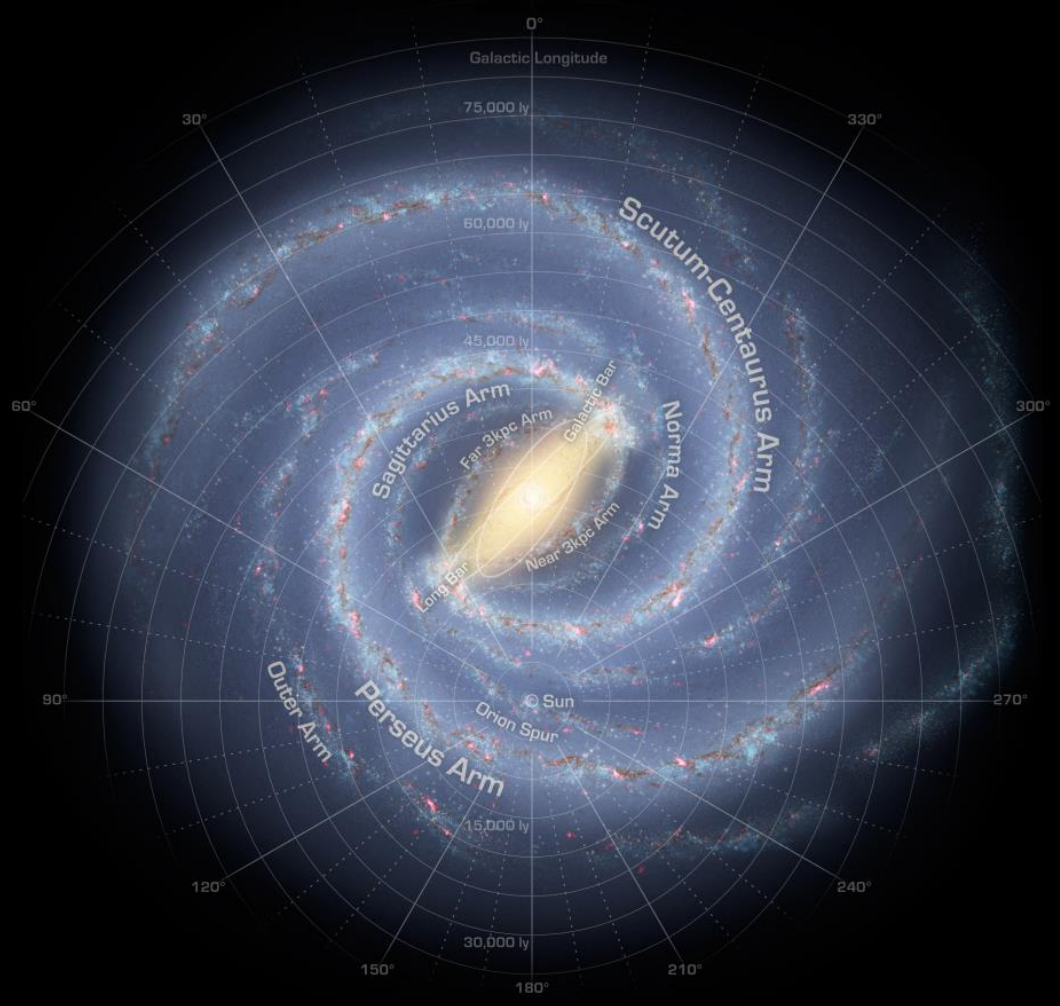
Credits: NASA/JPL-Caltech

Stamps Issued by the US Post Office and Argentina Post Office

Outlines

- Earth, where and what is?
- Space, where and what is?
- What is the meaning of ”Understanding of Earth from Space”?
- How much we know about earth, today?
- What is the next?

Graphic view of our Milky Way Galaxy



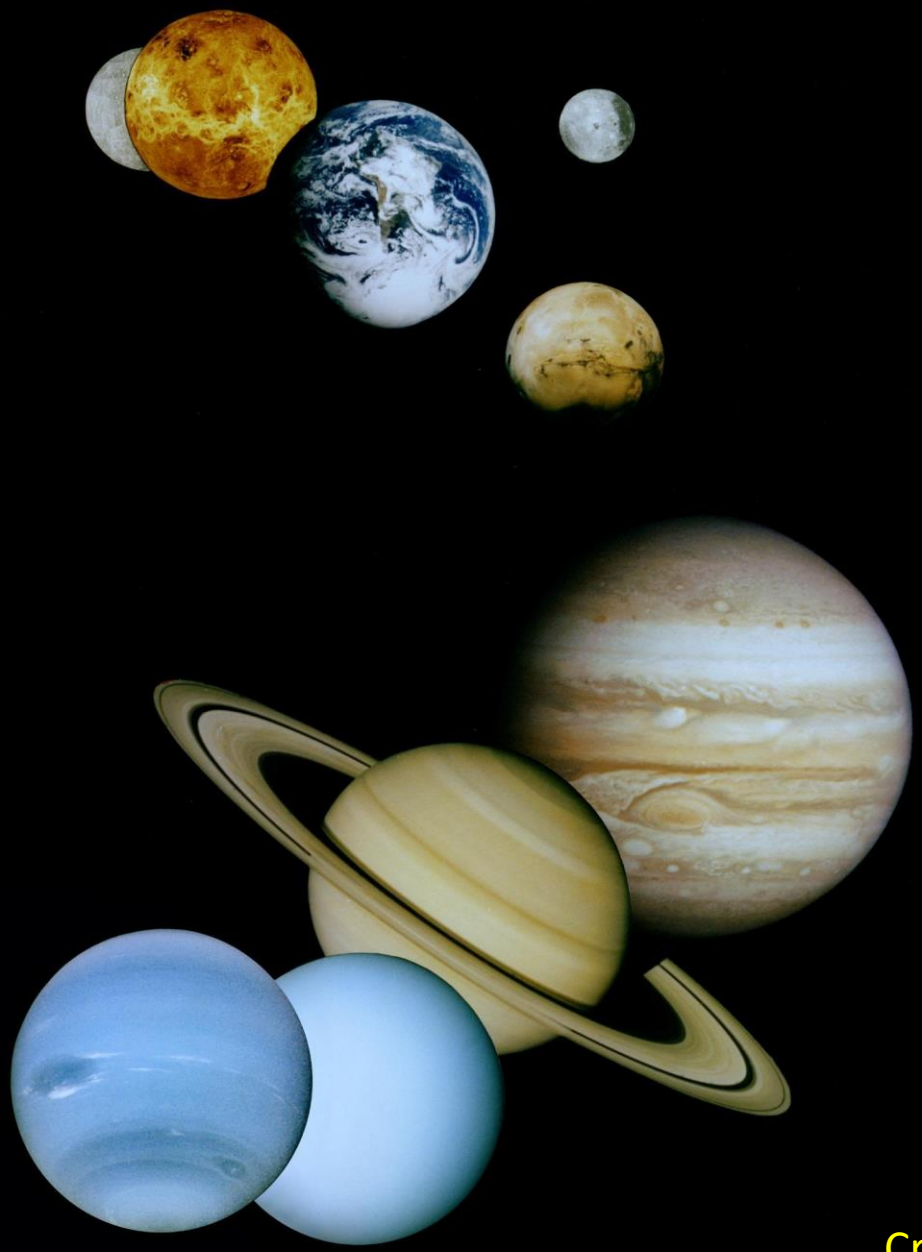
Where is our milky way in the universe?

Nowhere special. It is one galaxy in a small group of galaxies which we know as the Local Group.

Sun

Credit: NASA/Adler/U. Chicago/Wesleyan/JPL-Caltech

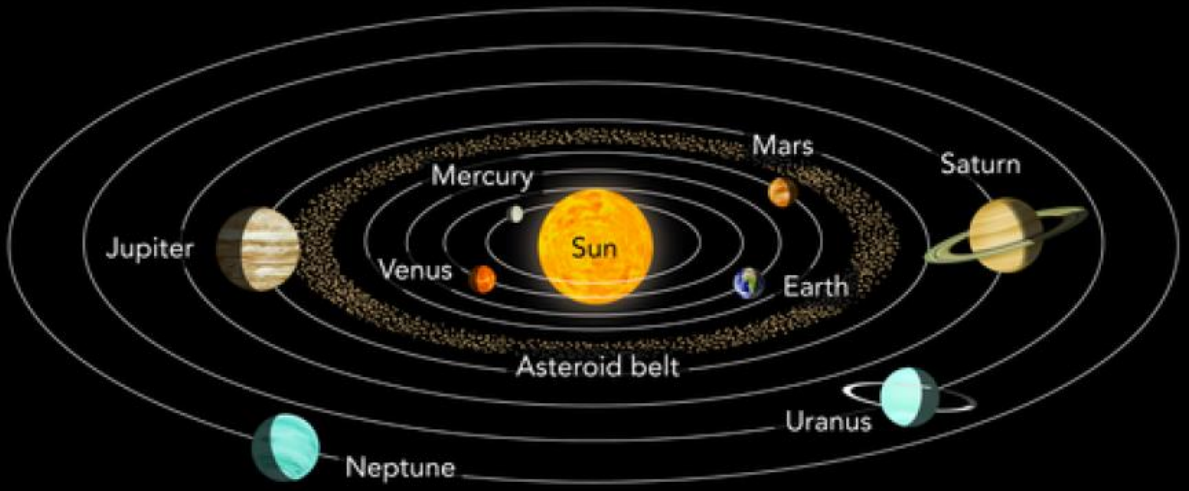
The Solar System



Credit: NASA/JPL-Caltech

Where is the Sky?

Credit: NASA/JPL-Caltech



The nearest stars: Alpha Centauri A and B: 4.24 light years
Credit: NASA/JPL-Caltech

Where is the Space?

- Sun 0 km
- Mercury 57,910,000
- Venus 108,200,000
- Earth 149,600,000
- (18 yrs by a plane)
- Mars 227,940,000
- (28 yrs by a plane)
- Jupiter 778,330,000
- Saturn 1,429,400,000
- Uranus 2,870,990,000
- Neptune 4,504,300,000
- Pluto 5,913,520,000
- Moon to earth 384,000
- (16 days by a plane)

- Astronaut wings, 92.6 km
- Space Shuttle – Mission depended, 180 km – 400 km
- International Spacestation 400km
- Most Remote Sensing - 700 km altitude
- Geostationary Orbit (GEO) (24 hrs orbit period, above 35,000 km)

Earth and the Solar System

- What would solar system visitors notice?
  - Magnetic field.
  - Atmosphere.
  - Surface features.
    - Continents.
    - Oceans.
    - Polar ice caps.
    - Evidence of humanity?
      - Structures.
        - » Dams.
        - » Great Wall of China.
        - » Cities.
        - » Roads / canals.
      - Electric lights.

Credit: NASA/JPL-Caltech

水深火熱

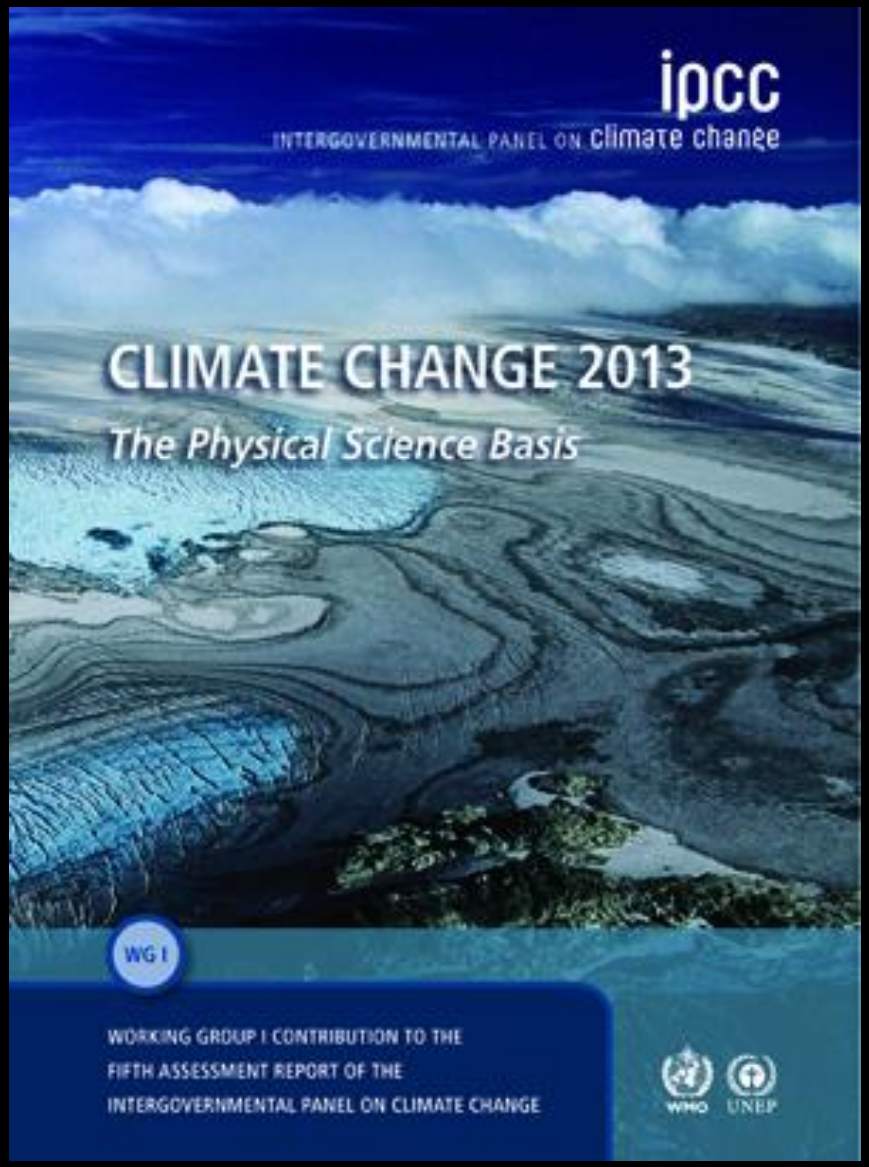
(Deep Water, Hot Fire)

飢寒交迫

(Hunger, cold)

http://www.acmad-au.org/sample-page/about-mesa/

New U.N. report: Humans responsible for climate change



Humans Responsible for Climate Changes

- 2013 Report indicates
  - 95 percent certainty that humans have caused most of the warming of the planet's surface that has occurred since the 1950s
  - up from 90 percent certainty in the last assessment report, which came out in 2007.

Big Questions

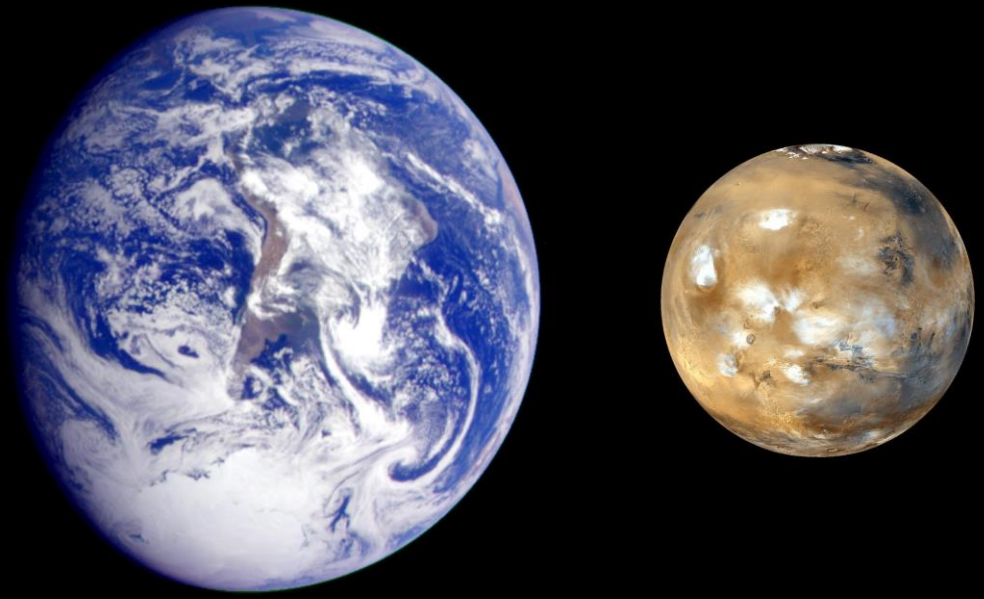
- How is our environment changing?
- What are the causes?
- Is any thing that we can limit/reverse these changes?

NASA collects global, space-based measurements to address these questions

Understanding of Mars and Earth by Space Technology

Use Space Technology goes to Mars for exploration.
We are on earth, why do we still need space technology for the earth exploration?

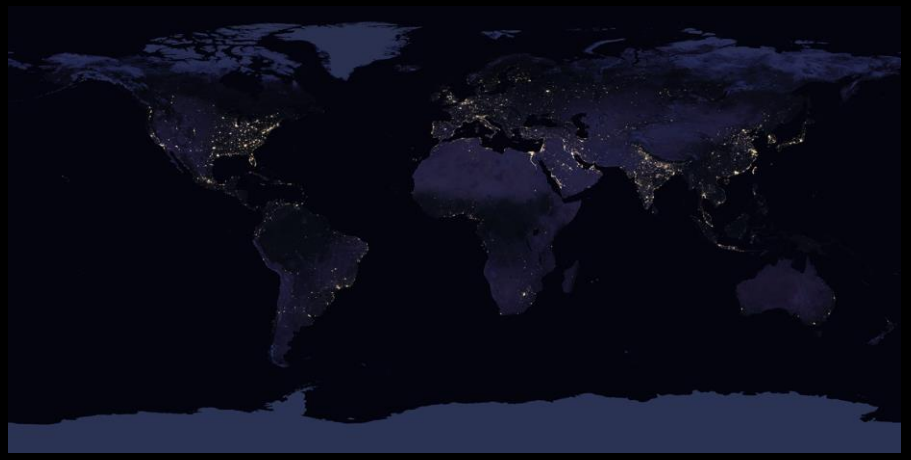
Necessity



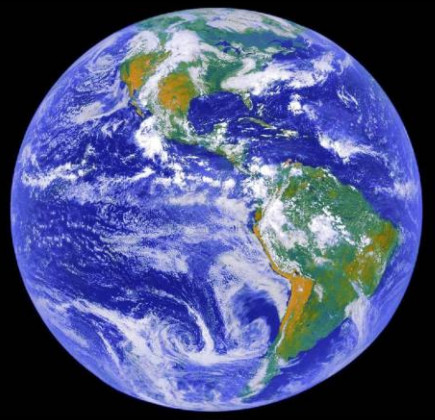
Curiosity

Earth

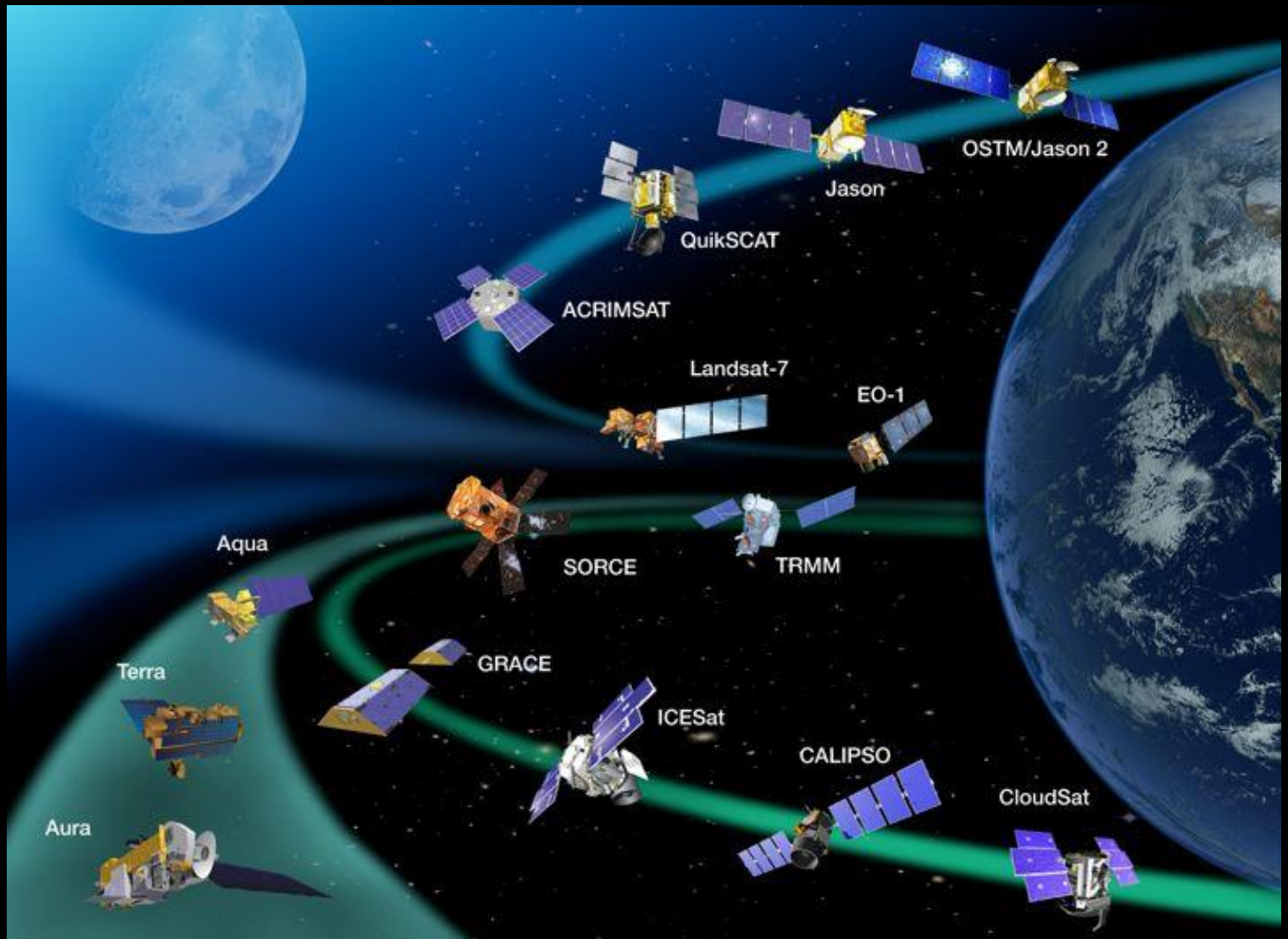
- Features of our earth:
  - Magnetic field
  - Atmosphere
  - Surface features
    - Ocean
    - Continents
    - Polar ice caps
    - Human, animals, plants, etc.
      - Great Wall, High Ways (Traffics), electricity, etc



Images are downloaded from JPL public web sites



NASA's Role: Space Based Observations



Images are downloaded from JPL public web sites

Why Space Technology?

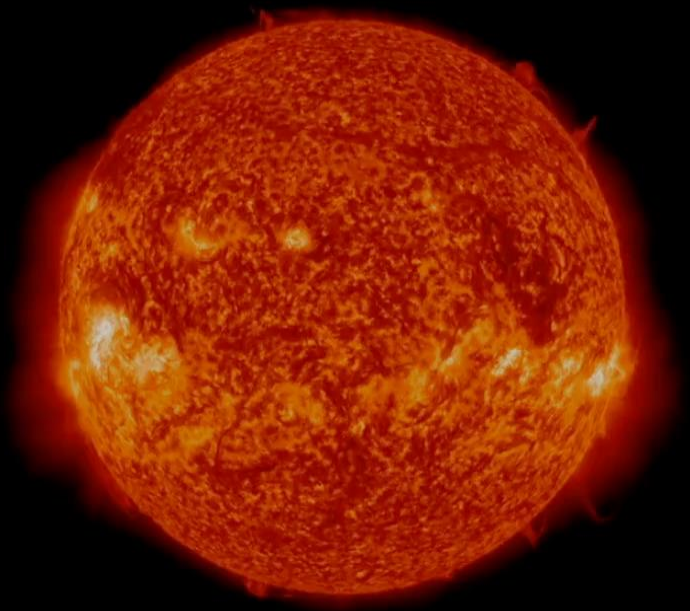
Images are downloaded from JPL public web sites

What is Space Technology?

Typical Observatory

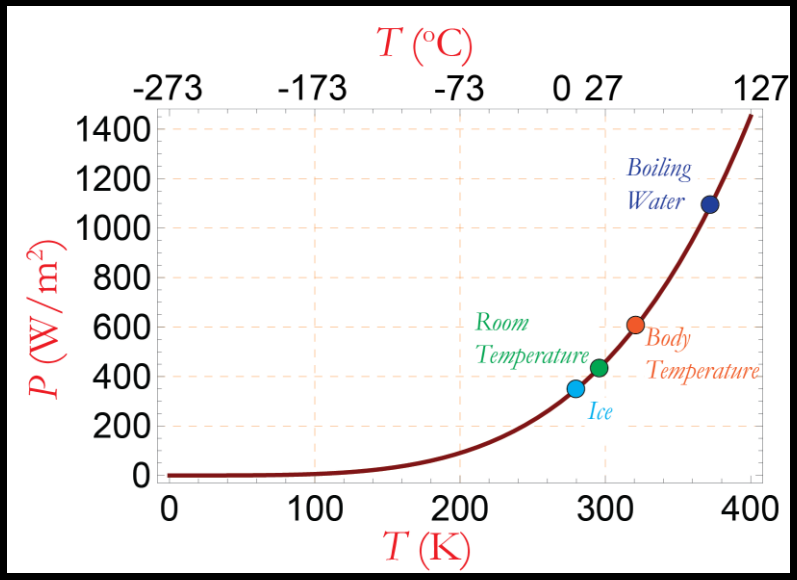
Observatory:
Spacecraft (Bus) + Instrument (s)

How to predicate Floor



SC

Instrument - temperature

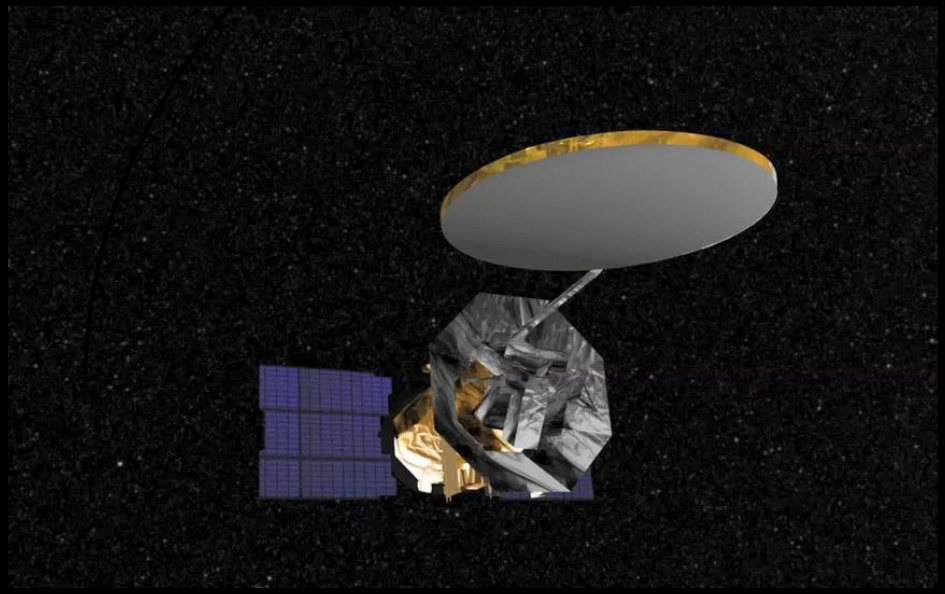


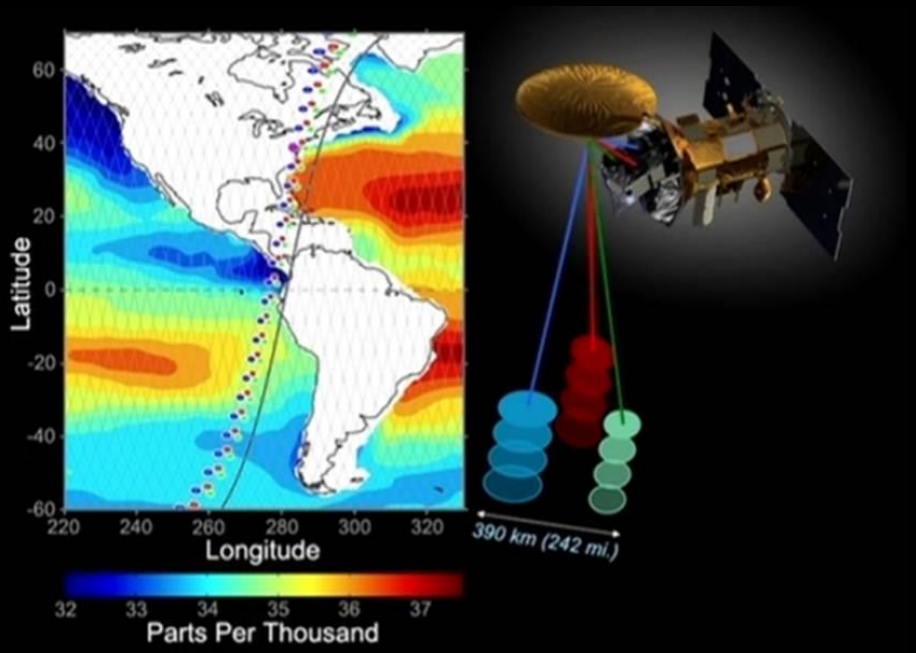
Credit: GRIFEX, David Rider, JPL

Salinity Mission

Orbit: Sun-Synchronous exact repeat
6pm ascending node
Altitude 657 km

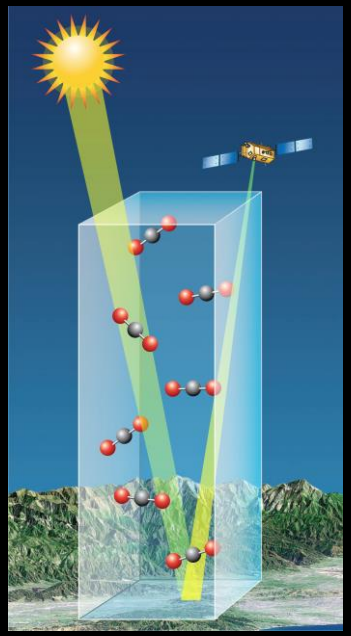
Aquarius Radiometer & Scatterometer beams point toward the night side to avoid sun glint





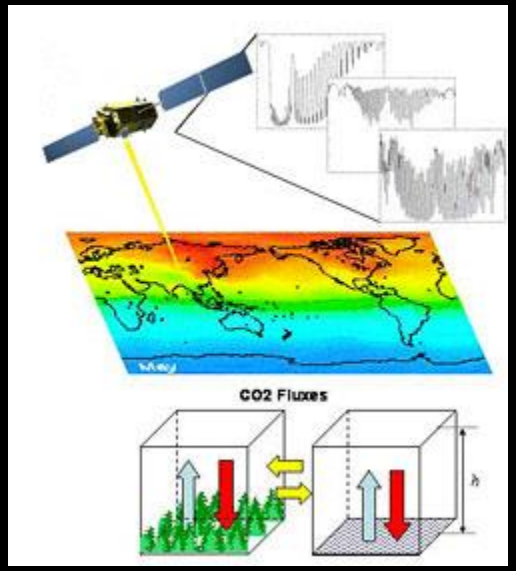
- *Global Coverage in 7 Days*
- *4 Repeat Cycles per Month*

OCO & OCO-2 Histories



OCO Launch
Februarv 24. 2009

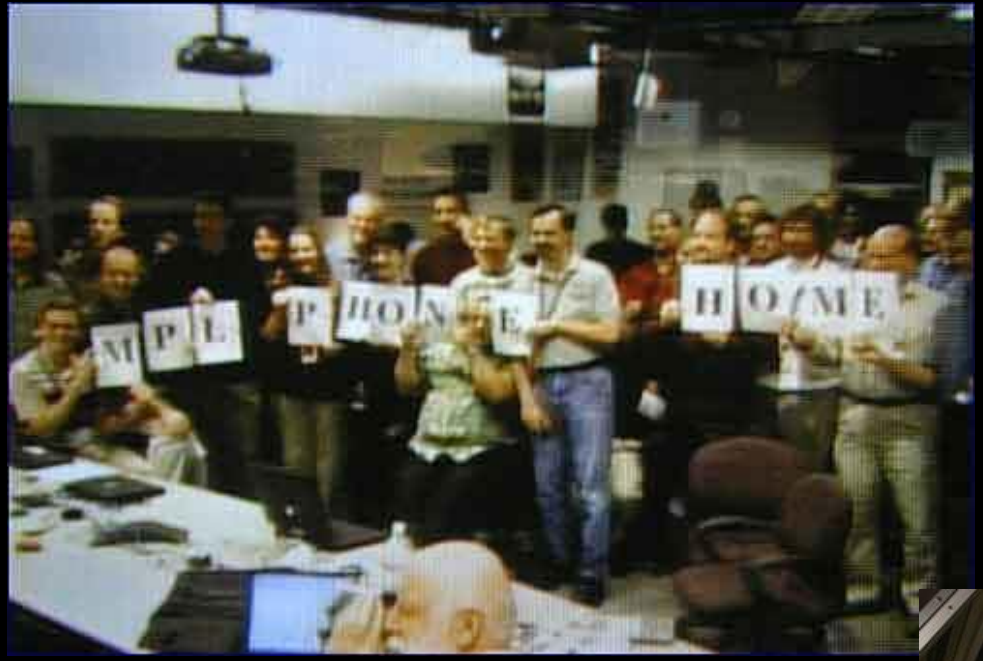
OCO-2 Launch
July 2, 2014



Summary

- **Global Warming is Real**
  - human is responsible for it
- **Space Technology is necessary for solving the Global Warming Issue**
  - Space Technology is Challenge; don’t ever give up
- **Help solving the Global Warming issue**
  - Is any thing that we can limit/reverse these changes?
  - Support and Join the space exploration

End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